



Edmund Ndudi Ossai*, Nelson C Eze, Okwudiri Chukwu, Ugochinyere A Uguru, Ezinne C Ukpai and Ezeogo Ihere

Department of Community Medicine, College of Health Sciences, Ebonyi State University Abakaliki, Nigeria

Dates: Received: 02 January, 2018; Accepted: 12 January, 2018; Published: 16 January, 2018

***Corresponding author:** Edmund Ndudi Ossai, Department of Community Medicine, College of Health Sciences, Ebonyi State University Abakaliki, Nigeria, Tel: +234 803 6675417; E-mail: ossai_2@yahoo.co.uk

Keywords: Knowledge, practice, blood donation, undergraduates, Ebonyi state, southeast Nigeria

<https://www.peertechz.com>

Research Article

Determinants of practice of blood donation among undergraduate students of Ebonyi State University Abakaliki, Southeast Nigeria

Abstract

Objective: Aim of study was to determine the factors affecting the practice of blood donation among undergraduate students of Ebonyi State University Abakaliki, southeast Nigeria.

Methods: A descriptive cross sectional study design was employed. A three stage sampling technique was used to select 300 students of the institution. Information was obtained using a self-administered questionnaire. Outcome measure of the study is the proportion of the students that has ever donated blood. Good knowledge of blood donation was determined by the proportion of students who correctly answered seven of the ten variables used to assess knowledge.

Results: The mean age of the students was 23.2 ± 3.0 years and majority, 60% were females. Majority, 86.7% were aware of blood donation. Majority, 69.3% had good knowledge of blood donation. A minor proportion, 36.3% were certain blood in blood bank were safe, while 59.3% were willing to donate blood in the future. A minor proportion, 13.3% have ever donated blood of which 55% of them have donated once. Major reasons for not donating blood included fear, 53.8%, no interest/ignorance, 19.6% and cultural/religious belief, 9.2%. Predictors of being a blood donor included being male, (AOR=3.8; 95% CI:1.7-8.2), willingness to donate blood in future, (AOR=3.1; 95% CI:1.3-7.5) and being of low socio-economic status, (AOR=0.4; 95% CI:0.2-0.9).

Conclusions: Majority of respondents had good knowledge of blood donation but only a minor proportion has ever donated blood, however, majority were willing to donate blood in the future. The major barriers to the practice of blood donation among the students were based on misconceptions and lack of information. There is the need for adequate public enlightenment and regular blood donation awareness campaigns in the university and the society at large. The aim of such campaigns which should emphasize the benefits of blood donation would be to target those who are willing to donate blood in the future as they could be the mainstay of blood donation if properly motivated especially in developing countries.

Introduction

Human blood is an important element of human life [1]. Incidentally, there is no substitute to blood hence donation of blood by humans is of utmost importance [2]. Presently, it is the most donated tissue in medical practice and the ability to transfuse blood and its components is regarded as one of the great advances in modern medicine [3]. Blood transfusion service is thus becoming an indispensable component of health care and has been so useful and life-saving in both routine and emergency situations [4]. It is estimated that an approximate 25% of maternal deaths could be prevented by the availability of safe blood [5,6]. Interestingly, advances in clinical science

and the attendant increase in the population of the world has further increased the need for blood.

In spite of the relevance of blood donation, the major challenge to the transfusion of blood is meeting the increasing demand for blood and ensuring its constant supply. Also, the use of blood and blood products may also be associated with complications some of which could threaten life. The donation of blood by individuals for the purpose of transfusion is influenced by several factors including altruism, social pressure, behaviour and replacement needs [7,8]. Blood donors could be categorized into three including voluntary non-remunerated, family or replacement and remunerated or paid. The safest donors are those who donate blood voluntarily

primarily motivated by altruism and this is because they are aware they could be unsuitable to serve as blood donors when there is a risk of causing harm to the recipients [9]. Unfortunately, the recruitment of voluntary, non-remunerated blood donors poses major challenges to transfusion services throughout the world [10].

There is evidence that the donation of blood is safe and of good effect to the donor, recipient, community and the blood transfusion service [11–13]. It has also been found that voluntary blood donation benefits the donor medically as it reduces insulin resistance thus improving the glucose balance in the body [14]. Regardless of these facts, several misconceptions, inadequate knowledge and negative attitudes affect the practice of blood donation [11,15,16]. The World Health Organization has posited that blood donation by 1% of the population is the minimum that could meet the most basic requirements of blood for any country [17]. Incidentally, the rate of blood donation is closely related to level of development with the low income countries having the least when compared with high and middle income countries [18].

As a way of recognizing voluntary blood donors, the World Health Assembly officially designated the 14th day of June every year as World Blood Donor day. The day has also been used to encourage more people to become regular blood donors. Based on the relevance of blood to human life, motivation, recruitment and retention of voluntary blood donors are important to achieve safe blood donation as they are considered to be the safest source [19]. The World Health Organization is of the opinion that more young people donate blood in low and middle countries than in high income countries. This necessitates that demographic information of blood donors is of relevance in the formulation of strategies for the recruitment of donors [18].

This has informed the decision of the World Health Organization in encouraging countries in the world to focus on young generation in-order to achieve 100% voluntary unpaid blood donors [17]. In every country of the world, undergraduate students constitute a huge portion of this group. This study was designed to determine the factors affecting the practice of blood donation among undergraduate students of Ebonyi State University Abakaliki, southeast Nigeria.

Methodology

Setting

Ebonyi State was created on the first day of October 1996 out of the present Enugu and Abia states in southeast Nigeria. The Abakaliki campus of the then Enugu State University of Technology was upgraded to Ebonyi State University College by the State Edict of 1998 and it remained affiliated to its parent university until 1999 when it became a full-fledged university.

Study design: This was a descriptive cross-sectional study

Study participants

The study population were undergraduate students of Ebonyi State University Abakaliki, southeast Nigeria. For

inclusion in the study, the student must have stayed more than one full academic year in the university.

Study instrument

The study instrument was a pre-tested, semi-structured questionnaire which was developed by the researchers. The questionnaire was self-administered. It elicited questions on the socio-demographic characteristics of respondents, knowledge and practice of blood donation and the reason for donating and not donating blood.

Sample size determination

The minimum sample size for the study was determined by the formula used for single proportions. [20] A sample size of 300 students was used in the study based on a type 1 error (α) of 0.05, a tolerable margin of error of 0.05 and the proportion of 15% that had donated blood in a previous study [11].

Sampling technique

A three stage sampling technique was employed in the study. In the first stage a simple random sampling technique of balloting was used to select three out of the eight faculties in the university. In the second stage, a simple random sampling technique of balloting was used to select two departments in each of the three selected faculties. In the third stage, a systematic random sampling technique was used to select the respondents. The number of undergraduate students present on the day of data collection in the two departments selected for each of the faculties was recorded. By dividing this number by fifty a sampling interval was obtained. (Each of the faculties contributed fifty students for the study). The index student was selected by a simple random sampling technique of balloting. All first year students of the university were excluded from the study.

Data analysis

Data entry and analysis were done using Statistical Package for Social Sciences (SPSS) version 22. Frequency tables and cross tabulations were generated. Chi square test of statistical significance and multivariate analysis using binary logistic regression were used in the analysis and the level of statistical significance was determined by a p value of less than 0.05. In determining the predictors of being a blood donor, variables that had a p value of less than 0.2 on bivariate analysis were entered into the logistic regression model. The results were reported using adjusted odds ratios (AOR) and 95% confidence interval.

Ethical approval

Ethical approval for the study was obtained from the Research and Ethics Committee of Ebonyi State University Abakaliki, southeast Nigeria. The students were required to sign a written informed consent form before participating in the study. Participation in the study was voluntary and participants were assured that there would be no victimization of any student who did not want to participate or who decided to withdraw after giving consent.

Results

Table 1 shows the socio-demographic characteristics of respondents. The mean age of the respondents was 23.2 ± 3.0 years and a higher proportion of the respondents, 69.3% were less than 25 years. Majority of the respondents, 60.0% were females.

Table 2 shows the knowledge of blood donation among the respondents. Majority of the respondents, 86.7% were aware of blood donation and a higher proportion of the respondents, 84.7% knew their blood group. Majority of the respondents, 73.0% were aware of where to donate blood. A higher proportion of the respondents, 69.3% had good knowledge of blood donation.

Table 1: Socio-demographic characteristics of respondents.

Variable	Frequency (n=300)	Percent (%)
Age (years)		
Mean \pm (SD)	23.2 \pm 3.0	
Age of respondents in groups		
< 25 years	208	69.3
\geq 25 years	92	30.7
Gender		
Male	120	40.0
Female	180	60.0
Ethnicity		
Igbo	296	98.7
Others**	4	1.3
Educational attainment of Father		
No formal education	27	9.0
Primary education	75	25.0
Secondary education	80	26.7
Tertiary education	118	39.3
Educational attainment of Mother		
No formal education	26	8.7
Primary education	79	26.3
Secondary education	81	27.0
Tertiary education	114	38.0
Employment status of Father		
Self employed	188	62.7
Salaried employment	112	37.3
Employment status of Mother		
Self employed	201	67.0
Salaried employment	99	33.0
Location of secondary school		
Urban	175	58.3
Rural	125	41.7
Socio-economic status		
Low socio-economic status	151	50.3
High socio-economic status	149	49.7

** minority tribes (Nigeria)

Table 2: Knowledge of Blood Transfusion among the respondents.

Variable	Frequency (n=300)	Percent (%)
Aware of blood donation		
Yes	260	86.7
No	40	13.3
Knowledge of one's blood group		
Yes	254	84.7
No	46	15.3
HIV could be transmitted by blood donation		
Yes	279	93.0
No	21	7.0
Hepatitis could be transmitted by blood donation		
Yes	181	60.3
No	119	39.7
Malaria could be transmitted by blood donation		
Yes	201	67.0
No	99	33.0
Aware blood is screened before transfusion		
Yes	269	89.7
No	31	10.3
Males and females can donate blood		
Yes	267	89.0
No	33	11.0
Aware of where to donate blood		
Yes	219	73.0
No	81	27.0
Blood donation is harmful to the donor		
Correct	157	52.3
Incorrect	143	47.7
Aware of blood donation awareness campaigns		
Yes	134	44.7
No	166	55.3
Blood could be donated more than once in a year		
Yes	152	50.7
No	148	49.3
Knowledge of blood donation		
Good knowledge	208	69.3
Poor knowledge	92	30.7

Table 3 shows the willingness to donate blood among the respondents. A minor proportion of the respondents were willing to receive blood when the need arises while the majority of the respondents, 80.7% were willing to donate blood to a relative. A higher proportion of the respondents, 59.3% were willing to donate blood in the future while a minor proportion, 36.3% were of the opinion that blood in blood bank is safe.

Table 4 shows the practice of blood donation among the respondents. A minor proportion, 13.3% has ever donated blood, however majority of those who have donated blood, 75.0% did that on voluntary basis. The major reason for donating blood, 52.5% was to save lives while fear, 53.8% was the major reason for not donating blood.

Table 5 shows the factors affecting the donation of blood by the respondents. The male students were about four times more likely to be a blood donor when compared with the female students, (AOR 3.8, 95% CI: 1.7–8.2). Also, the students who were willing to donate blood in the future were three times more likely to donate blood when compared with those who were not willing. (AOR 3.1, 95%CI: 1.3–7.5). The students who were in the low socio-economic group were 2.5 times less likely to be a blood donor when compared with those in the high socio-economic group. (AOR 0.4, 95%CI: 0.2–0.9).

Discussion

Majority of the respondents, 86.7% were aware of blood donation. This was expected bearing in mind the level of education of the respondents. In another study among undergraduates in a Nigerian university, 88.5% of the respondents have also heard of blood donation [21]. The high level of education of the respondents could also explain why a very high proportion of the students were aware of their blood groups and where to donate blood. Interestingly, majority of the respondents, 69.3% had good knowledge of blood donation. This finding is similar to that observed in a study

Table 4: Practice of blood donation among the respondents.

Variable	Frequency (n= 300)	Percent (%)
Ever donated blood before		
Yes	40	13.3
No	260	86.7
Number of times blood has been donated	(n=40)	
Once	22	55.0
Twice	13	32.5
>2 times	5	12.5
Type of Blood donation		
Voluntary	30	75.0
Not voluntary	10	25.0
Reason for donating blood	(n=40)	
Save lives	21	52.5
Lack of blood/Emergency	8	20
Financial incentive	3	7.5
No specific reason	8	20.0
Reason for not donating blood	(n=260)	
Fear /uncertainty	140	53.8
No interest/ignorance	51	19.6
Cultural/religious beliefs	24	9.2
No encouragement for donors	19	5.3
No specific reason	26	10.0

Table 3: Willingness to donate blood among the respondents.

Variable	Frequency (n=300)	Percent (%)
Willingness to receive blood when in need		
Yes	136	45.3
No	164	54.7
Willingness to donate blood to a relative		
Yes	242	80.7
No	58	19.3
Willingness to donate blood to someone you do not know		
Yes	203	67.7
No	97	32.3
Ever encouraged anyone to donate blood		
Yes	101	33.7
No	199	66.3
Willing to donate blood in the future		
Yes	178	59.3
No	122	40.7
Should blood donors be remunerated		
Yes	97	32.3
No	203	67.7
Blood in blood bank is safe		
Yes	109	36.3
No	191	63.7

among undergraduate students in another Nigerian university [11], but higher than that obtained from other studies [21–23].

The finding that majority of undergraduate students in this study had good knowledge of blood donation is commendable as this may be the means to correct the several misconceptions that are associated with blood donation. This is important bearing in mind that the World Health Organization has affirmed that young people which includes undergraduate students are the main blood donors in developing countries [18].

A higher proportion of the respondents were willing to donate blood to a relative, (80.7%) or to someone they do not know, 67.7% when compared to those who were willing to receive blood when in need, 45.3%. This could be an expression of lack of trust in the practice of blood donation and of the blood bank system in the country. This was further confirmed by the proportion of the students (35.3%) who were of the opinion that blood in the blood bank is safe. This proportion that attested to the safety of blood in the blood bank is very low when compared to that from a similar study in India [24]. The marked disparity may be an indication that the youths in Nigeria and India perceive the practice of blood donation and issues of blood bank differently. It is however worth recognizing that the respondents in the study in India were students in the medical sciences only.

A minor proportion of the respondents, 13.3% have ever donated blood. This is similar to that from other studies in Nigeria [11,21], and another in Ethiopia [23], and India [25].

Table 5: Factors affecting the donation of blood by the respondents.

Variable	Ever donated blood(n=300)		p value*	AOR (95% CI)**
	Yes N(%)	No N(%)		
Knowledge of blood transfusion				
Good	34 (16.3)	174 (83.7)	0.021	1.5 (0.5- 4.0)
Poor	6 (6.5)	86 (93.5)		
Age of respondents				
<24 years	13 (8.3)	144 (91.7)	0.007	0.5 (0.2- 1.1)
≥24 years	27 (18.9)	116 (81.1)		
Gender of respondents				
Male	27 (22.5)	93 (77.5)	<0.001	3.8 (1.7-8.2)
Female	19 (7.2)	167 (92.8)		
Socio-economic status				
Low socio-economic status	13 (8.6)	138 (91.4)	0.015	0.4 (0.2-0.9)
High socio-economic status	27 (18.1)	122 (81.9)		
Employment status of Father				
Self employed	24 (12.8)	164 (87.2)	0.708	NA
Salaried employment	16 (14.3)	96 (85.7)		
Employment status of Mother				
Self employed	24 (11.9)	177 (88.1)	0.312	NA
Salaried employment	16 (16.2)	83 (83.8)		
Location of secondary school				
Urban	22 (12.6)	153 (87.4)	0.646	NA
Rural	18 (14.4)	107 (85.6)		
Educational attainment of Father				
Tertiary education	15 (12.7)	103 (87.3)	0.799	NA
Secondary education and less	25 (13.7)	157 (86.3)		
Educational attainment of Mother				
Tertiary education	16 (14.0)	98 (86.0)	0.780	NA
Secondary education and less	24 (12.9)	162 (87.1)		
Willingness to donate blood in the future				
Yes	32 (18.0)	146 (82.0)	0.004	3.1 (1.3- 7.5)
No	8 (6.6)	114 (93.4)		

*p value on bivariate analysis; **Adjusted odds ratio (95% Confidence Interval)
NA Not applicable

blood could be addressed through public enlightenment with emphasis on the good to be derived from blood donation and this could be done during the blood donation awareness campaigns.

From the results of this study, the male students were about four times more likely to be blood donors when compared with the female students. This is understandable as men are known to have a higher packed cell volume than females. Also, females are exposed to monthly menstrual periods and child delivery all of which result in loss of blood. Moreover due to the monthly menstrual cycles there are times females may not be able to donate blood. The observation that males participate more in blood donation when compared with females is consistent with findings from other studies [21-23,31,32]. However, in a study among university students in Kilimanjaro Tanzania, males students had a lower odds of donating blood than the females [28]. This could mean that females in Tanzania may have more social responsibilities than what is obtained in the other countries under consideration.

The students who were willing to donate blood in the future were three times more likely to be blood donors when compared with those who were not. This is in agreement with the results of a similar study in Tanzania [28]. From the results of this study also, majority of the students were willing to donate blood in the future and this is much higher than the proportion that have actually donated blood. This is also similar to findings from other studies [28,30,33,34]. To an extent the future of voluntary blood donation might be closely related to the proportion that are willing to donate blood in the future, implying that they could be the mainstay of blood donation if adequately motivated. Identifying this group may be difficult, however, they could be the target during blood donation awareness campaigns. It has been found that only beliefs in benevolence were associated with the intention to donate blood hence the suggestion that blood donation campaigns should focus on its beneficial aspects [35]. There is evidence that the donation of blood is safe and of good effect to the society as a whole [11-13]. Thus, focusing the message of future blood donation awareness campaigns on the concept that blood is of immense benefit to mankind could appeal to this group of individuals thus leading to increased blood donation in the future especially in developing countries.

The respondents who were in the low socioeconomic group were about three times less likely to donate blood when compared with those in the high socioeconomic group. Socioeconomic status has been found to be associated with the status of being a blood donor [36]. In a study in Pelotas, southern Brazil, the prevalence of blood donation increased with the economic level of the respondents [37]. Similarly, in a study in Denmark, respondents who were in the middle and high income groups but excluding the highest income group had a fourfold higher blood donor prevalence when compared to the lowest income group [38]. Since blood is an essential element of human life [1], it could be that those in the low socioeconomic group are more conservative hence more unwilling to part with something as precious as blood since they may be unsure of its replacement. The difference could

These proportions were lower than that from the results of other studies. [22,26-28] The differences could be a reflection of the perception of the practice of blood donation in the various societies. Also, among those who donated, majority were first time blood donors and this is similar to the results from other studies also [23,29,30]. The explanation for this could be that the donors may have donated blood out of need. It is important to note that after the first donation, the students could also donate again if properly motivated.

The major reason for donating blood among the respondents was to save lives. In a study among undergraduates in a Nigerian university, the major motivation to donating blood by the students was the intention to save lives [11]. Also, the major reason for not donating blood was fear and same result was obtained in other studies [22,23]. Even though the practice of blood donation has been adjudged to be safe, people still have many wrong ideas about it [11,15,16]. It is also important to note that all the reasons provided by the students for not donating

also be a reflection of the different levels of understanding of the practice of blood donation among those in the low and high socioeconomic groups.

Conclusions

Majority of respondents had good knowledge of blood donation but only a minor proportion has ever donated blood, however, majority were willing to donate blood in the future. The major barriers to the practice of blood donation among the students were based on misconceptions and lack of information. There is the need for adequate public enlightenment and regular blood donation awareness campaigns in the university and the society at large. The aim of such campaigns which should emphasize the benefits of blood donation would be to target those who are willing to donate blood in the future as they could be the mainstay of blood donation if properly motivated especially in developing countries.

References

- Nwogoh B, Aigberadion U, Nwannadi AI (2013) Knowledge, attitude and practice of voluntary blood donation among healthcare workers at the University of Benin Teaching Hospital, Benin City, Nigeria. *Journal of Blood Transfusion*. [Link: https://goo.gl/JHQA1Z](https://goo.gl/JHQA1Z)
- Lowe KC, Ferguson E (2003) Benefit and risk perceptions in transfusion medicine: blood and blood substitutes. *Journal of Internal Medicine* 253: 498-507. [Link: https://goo.gl/vLDFdz](https://goo.gl/vLDFdz)
- Zmijewski CM, Haesler WE (1982) *Blood banking service*. Appleton Century Croft. 1982. New York. [Link: https://goo.gl/rCA9Vr](https://goo.gl/rCA9Vr)
- World Health Organization (2016) Towards 100% voluntary blood donation, a global framework for action. Available at. [Link: https://goo.gl/tVklVC](https://goo.gl/tVklVC)
- Hensher M, Price M, Adomakoh S (2006) Referral hospitals. Disease control priorities in developing countries 66: 1229-1212. [Link: https://goo.gl/Ljgjj7](https://goo.gl/Ljgjj7)
- Weiser TG, Regenbogen SE, Thompson KD, Hayne AB, Lipsitz SR, et al. (2008) An estimation of the global volume of surgery: a modelling strategy based on available data. *The Lancet* 372: 139-144. [Link: https://goo.gl/6AB459](https://goo.gl/6AB459)
- Oswalt RM, Hoff TE (1977) The motivations of blood donors and non donors: a community survey. *Transfusion* 15: 68-73. [Link: https://goo.gl/onG2xQ](https://goo.gl/onG2xQ)
- Zaller N, Nelson KE, Ness P, Wen G, Bai X, et al. (2005) Knowledge, attitude and practice survey regarding blood donation in a north western Chinese city. *Transfus Med* 15: 277-286. [Link: https://goo.gl/hRTx9Y](https://goo.gl/hRTx9Y)
- Buyx AM (2009) Blood donation, payment and non-cash incentives: classical questions drawing renewed interest. *Transfusion Medicine and Hemotherapy* 36: 329-339. [Link: https://goo.gl/QaWcr6](https://goo.gl/QaWcr6)
- Misje AH, Bosnes V, Heier HE (2010) Gender differences in presentation rates, deferrals and return behavior among Norwegian blood donors. *Vox Sang* 98: e241-248. [Link: https://goo.gl/ueXP5L](https://goo.gl/ueXP5L)
- Salaudeen AG, Odeh E (2011) Knowledge and behavior towards voluntary blood donation among students of a tertiary institution in Nigeria. *Niger J Clin Pract* 14: 303-307. [Link: https://goo.gl/xUuDPg](https://goo.gl/xUuDPg)
- Shenga N, Pal R, Sengupta S (2008) Behavior disparities towards blood donation in Sikkim, India. *Asi J Transfus Sci* 2: 56-60. [Link: https://goo.gl/fB6nAv](https://goo.gl/fB6nAv)
- Amatya M, Gorkhali B, Mahotra N, Prajapati R, Yadav SR (2013) Knowledge, attitude and practice of medical students on blood donation: a comparison between two medical colleges of Nepal. *Int J Curr Res* 5: 2641-2644. [Link: https://goo.gl/g631q9](https://goo.gl/g631q9)
- Real JMF, Bermejo AL, Ricart W (2005) Iron stores, blood donation and insulin sensitivity and secretion. *Clin Chem* 51: 1201-1205. [Link: https://goo.gl/B9xpV6](https://goo.gl/B9xpV6)
- Saeed N, Munir E, Shahid R (2011) Beliefs about blood donation among patients visiting OPDs of Pakistani's General Hospitals. *JBUMDC* 1: 61-67.
- Alzaben S, Salameh A, Alhiary M (2012) Knowledge and attitude about blood donation among blood donors at King Hussien Medical Centre. *Asian J Exp Biol Sci* 3: 435-438. [Link: https://goo.gl/PL6Vzv](https://goo.gl/PL6Vzv)
- World Health Organization (2016) World Blood Donor Day 2016: blood connects us all. [Link: https://goo.gl/SB9DKc](https://goo.gl/SB9DKc)
- World Health Organization (2016) Blood safety and availability. [Link: https://goo.gl/QrSd1Q](https://goo.gl/QrSd1Q)
- Siromani U, Rajaiah M, Daniel D, Mammen JJ, Nair SC (2012) Ahead to 100% of voluntary non-remunerated blood donation at a tertiary referral hospital blood bank in south India. *Asian J Transfus Sci* 6: 190. [Link: https://goo.gl/rKKivD](https://goo.gl/rKKivD)
- Taofeek I (2009) Research methodology and dissertation writing for health and allied health professionals. 1st edition. Abuja: Cress Global Link Ltd.
- Ogunbona OB, Okafor IP, Sekoni AO (2013) Knowledge and practice of blood donation among university undergraduates. *High Med Res J* 13: 26-30. [Link: https://goo.gl/YrhDn8](https://goo.gl/YrhDn8)
- Raghuwanshi B, Pehlajani NK, Sinha MK (2016) Voluntary blood donation among students- a cross-sectional study on knowledge and practice vs. attitude. *J Clin Diagn Res* 10: EC18-EC22. [Link: https://goo.gl/p6Vx7a](https://goo.gl/p6Vx7a)
- Ahmed AO (2017) Knowledge, attitude, practice and associated factors of voluntary blood donation among undergraduate students in Hargeisa University. *J Community Med Health Edu* 7: 547-559. [Link: https://goo.gl/qJHrNa](https://goo.gl/qJHrNa)
- Giri PA, Phalke DB (2012) Knowledge and attitude about blood donation amongst undergraduate students of Pravara Institute of Medical Sciences Deemed University of Central India. *Ann Trop Med Public Health* 5: 569-573. [Link: https://goo.gl/BYXgss](https://goo.gl/BYXgss)
- Aslami AN, Jobby A, Simon S, Nazarudeen N, Raj P, Ramees M, et al. (2015) Assessment of knowledge, attitude and practice (KAP) of blood donation among MBBS students of a medical college in Kollam, Kerala. *Journal of Evolution of Medical and Dental Sciences* 4: 6086-6095. [Link: https://goo.gl/KYkLeQ](https://goo.gl/KYkLeQ)
- Ciepiela O, Jaworska A, Lacheta D, Faalkowska N, Popko K, et al. (2017) Awareness of blood group and blood donation among medical students. *Transfus Apher Sci* 56: 858-864. [Link: https://goo.gl/xWrzX](https://goo.gl/xWrzX)
- Chopra D, Jauhari N (2015) Knowledge attitude & practices towards voluntary blood donation among medical students in Barabanki. *Indian J Comm Health* 27: 386-390. [Link: https://goo.gl/qDyHzd](https://goo.gl/qDyHzd)
- Elias E, Mauka W, Philemon RN, Damian DJ, Mahande MJ, et al. (2016) Knowledge, attitude. Practices and factors associated with voluntary blood donation among university students in Kilimanjaro, Tanzania. *Journal of Blood Transfusion* 14: 2016. [Link: https://goo.gl/HQH9kA](https://goo.gl/HQH9kA)
- Thakur A, Chauhan HS, Achanya B (2015) Knowledge and practices of blood donation among the undergraduate students of district Una, Himachal Pradesh, India. *Global Journal of Medicine and Public Health* 4. [Link: https://goo.gl/rwrujV](https://goo.gl/rwrujV)
- Jemberu YA, Esmael A, Ahmed KY (2016) Knowledge, attitude and practice towards blood donation and associated factors among adults in Debre Marks town, Northwest Ethiopia. *BMC Hematology* 16: 23-30. [Link: https://goo.gl/cSjd9Q](https://goo.gl/cSjd9Q)

31. Papagiannis D, Rachiotis G, Symvoulakis EK, Anyfantakis D, Douvlataniotis K, et al. (2016) Blood donation knowledge and attitudes among undergraduate health science students: a cross-sectional study. *Transfusion and Apheresis Science* 54: 303-308. [Link: https://goo.gl/BzV7f4](https://goo.gl/BzV7f4)
32. Ahmed Z, Zafar M, Khan AA, Anjum MU, Siddique MA (2014) Knowledge, attitude and practices about blood donation among undergraduate students in Karachi. *J Infect Dis Ther* 2: 134. [Link: https://goo.gl/5sz2RS](https://goo.gl/5sz2RS)
33. Devi HS, Laishram J, Shantibala K, Elangbam V (2012) Knowledge, attitude and practice (KAP) of blood safety and donation. *Indian Medical Gazette* 1-6. medind.nic.in/ice/t12/i1/icet12i1p1.pdf. [Link: https://goo.gl/5sz2RS](https://goo.gl/5sz2RS)
34. Latif MZ, Riaz H, Mujtaba SWA, Nizami R (2017) Blood donation; knowledge, attitude and practice of medical students. *Professional Med J* 24: 370-374.
35. Ferguson E, Farrell K, Lawrence C (2008) Blood donation is an act of benevolence rather than altruism. *Health Psychology* 27: 327-336. [Link: https://goo.gl/xYJqjK](https://goo.gl/xYJqjK)
36. Duboz P, Cuneo B (2009) Impact of socioeconomic status on blood donation. *Transfus Clin Biol* 16: 371-378. [Link: https://goo.gl/ci66gn](https://goo.gl/ci66gn)
37. Zago A, Silveira MF, Dumith SC (2010) Blood donation prevalence and associated factors in Pelotas, southern Brazil. *Revista de Saude Publica* 44: 112-120. [Link: https://goo.gl/fa2J9w](https://goo.gl/fa2J9w)
38. Burgdorf KS, Simonsen J, Sundby A, Rostgaard K, Pedersen OB, et al. (2017) Socio-demographic characteristics of Danish blood donors. *PLoS ONE* 12: e0169112. [Link: https://goo.gl/ohx4rU](https://goo.gl/ohx4rU)